

Radiation field:

$$h_{ij}^{\text{TT}}(\mathbf{x}, t) = \frac{G}{c^4} \frac{P_{ijklm}(\mathbf{n})}{r} \sum_{l=2}^{\infty} \left\{ \left(\frac{1}{c^2} \right)^{\frac{l-2}{2}} \frac{4}{l!} M_{kmi_3 \dots i_l}^{[l]} \left(t - \frac{r_*}{c} \right) N_{i_3 \dots i_l} \right. \\ \left. + \left(\frac{1}{c^2} \right)^{\frac{l-1}{2}} \frac{8l}{(l+1)!} \epsilon_{pq(k} S_{m)pi_3 \dots i_l}^{[l]} \left(t - \frac{r_*}{c} \right) n_q N_{i_3 \dots i_l} \right\}$$

Multipole moment with tail:

$$M_{ij} \left(t - \frac{r_*}{c} \right) = \hat{M}_{ij} \left(t - \frac{r_*}{c} \right) \\ + \frac{2Gm}{c^3} \int_0^{\infty} dv \ln \left(\frac{v}{2b} \right) \hat{M}_{ij}^{[2]} \left(t - \frac{r_*}{c} - v \right) + O(1/c^4)$$

$$r_* = r + \frac{2Gm}{c^2} \ln \left(\frac{r}{cb} \right) + O(1/c^3)$$